CLAIMS

What is claimed is:

1. A method for pattern recognition and processing of information, the information comprising data representative of physical characteristics or representations of physical characteristics within an input context of the characteristics, the method comprising the steps of:

a.) encoding the data as parameters of at least two Fourier components in Fourier space;

b.) adding the Fourier components to form at least two Fourier series in Fourier space, the Fourier series representing the information;

c.) sampling at least one of the Fourier series in Fourier space with a filter to form a sampled Fourier series;

d.) modulating the sampled Fourier series in Fourier space with the filter to form a modulated Fourier series;

e.) determining a spectral similarity between the modulated Fourier series and another Fourier series;

f.) determining a probability expectation value based on the spectral similarity;

g.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value;

h.) repeating steps a-g until the probability operand has a value of one;

i.) adding the modulated Fourier series and the another Fourier series to form a string of Fourier series in Fourier space, and

j.) recording the string of Fourier series to memory.

2. The method of claim 1, wherein each Fourier component of the Fourier series comprises a quantized amplitude, frequency, and phase angle.

3. The method of claim 2, wherein the Fourier series in Fourier space is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho 0}}N_{m_{z0}}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z0}}z_{0_m}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}\frac{4}{\rho_{0_m}z_{0_m}}a_{0_m}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z0}}z_{0_m}}{2}\right)$$

wherein a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho0}}$, $N_{m_{z0}}$, ρ_{0_m}, and z_{0_m} are data parameters selected from one of:

i.) each of the data parameters $N_{m_{\rho0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters $N_{m_{\rho0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters $N_{m_{\rho0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

4. A method of claim 1 wherein the step b further comprises encoding the input context in time as a characteristic modulation frequency band in Fourier space of the Fourier series.

5. The method of claim 4 wherein the characteristic modulation frequency band in Fourier space represents the input context according to at least one of a specific transducer or transducer element, and fundamental relationships including a temporal order, a cause and effect relationship, a size order, an intensity order, a before-after order, a top-bottom order, and a left-right order.

6. The method of claim 5 wherein the transducer has n levels of subcomponents and is assigned a master time interval with $n+1$ sub time intervals in a hierarchical manner that parallels and corresponds to the n levels of the transducer subcomponents wherein the data stream from the n th level transducer sub component is recorded as a function of time in the $n+1$ sub time interval and the time intervals represent time delays which correspond to the characteristic modulation frequency band in Fourier space which represents the input context according to the specific transducer or transducer subcomponent.

7. The method of claim 4 wherein the characteristic modulation having a frequency within the band in Fourier space is represented by $e^{-j2\pi f t_0}$ which corresponds to the time delay $\delta(t-t_0)$ wherein f is the frequency variable, t is the time variable, and t_0 is the time delay.

8. A method of claim 7 wherein the step b further comprises storing the characteristic modulation frequency in a distinct memory location within the band encoded as a delay in time.

9. The method of claim 7, wherein the Fourier series in Fourier space, has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ and is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho 0}}N_{m_{z0}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho 0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z0}}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}\frac{4}{\rho_{0_m}z_{0_m}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho 0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z0}}}{2}\right)$$

wherein $\rho_{t_m}=v_{t_m}t_{t_m}$ is the modulation factor which corresponds to the physical time delay t_{t_m}, $\rho_{fb_m}=v_{fb_m}t_{fb_m}$ is the modulation factor which corresponds to the specific transducer time delay t_{fb_m}, v_{t_m} and v_{fb_m} are constants such as the signal propagation velocities, a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho 0}}$, $N_{m_{z0}}$, ρ_{0_m}, and z_{0_m} are data parameters selected from one of:

i.) each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

10. The method of claim 7, wherein the string has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ is selected from one of:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho 0}}N_{s,m_{z0}}e^{-jk_\rho(\rho_{fb_{s,m}}+\rho_{t_{s,m}})}$$

$$\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

and

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}\frac{4}{\rho_{0_{s,m}}z_{0_{s,m}}}e^{-jk_\rho(\rho_{fb_{s,m}}+\rho_{t_{s,m}})}$$

$$\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $\rho_{t_{s,m}}=v_{t_{s,m}}t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}}=v_{fb_{s,m}}t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are

constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$, $N_{s,m_{z0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters selected from one of:

i.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the physical characteristic.

11. The method of claim 10, wherein each Fourier series of the string is multiplied by the Fourier transform of the delayed Gaussian filter represented by $e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\sqrt{\frac{N_{s\rho 0}}{\alpha_{s\rho 0}}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\sqrt{\frac{N_{sz0}}{\alpha_{sz0}}}(v_{sz0}k_z)}$ wherein the filter established the association to form the string, wherein the string is represented by:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho 0}}N_{s,m_{z0}}e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\sqrt{\frac{N_{s\rho 0}}{\alpha_{s\rho 0}}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\sqrt{\frac{N_{sz0}}{\alpha_{sz0}}}(v_{sz0}k_z)}$$

$$e^{-jk_\rho\left(\rho_{f\!b_{s,m}}+\rho_{t_{s,m}}\right)}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{v_{s,m}t_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho o}$ and v_{szo} are constants such as the signal propagation velocities in the ρ and z directions, respectively, $\sqrt{\frac{N_{s\rho o}}{\alpha_{s\rho o}}}$ and $\sqrt{\frac{N_{szo}}{\alpha_{szo}}}$ are delay

parameters and $\alpha_{s\rho 0}$ and α_{sz0} are half-width parameters of a corresponding Gaussian filter in the ρ and z directions, respectively, $\rho_{t_{s,m}} = v_{t_{s,m}} t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}} = v_{fb_{s,m}} t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$, $N_{s,m_{z0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters selected from one of:

i.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the physical characteristic.

12. A method of claim 1 wherein step b) further comprises creating transducer strings by obtaining a Fourier series from at least two selected transducers and adding the Fourier series.

13. A method of claim 12 further comprises selecting transducers that are active simultaneously.

14. The method of claim 13 wherein the transducer string is stored in a distinct memory location wherein a characteristic modulation having a

frequency within the band in Fourier space is represented by $e^{-j2\pi f t_0}$ which corresponds to the time delay $\delta(t-t_0)$ wherein f is the frequency variable, t is the time variable, and t_0 is the time delay.

15. The method of claim 14 wherein the step b) further comprises recalling any part of the transducer string from the distinct memory location which thereby causes additional Fourier series of the transducer string to be recalled.

16. The method of claim 1, wherein the filter is a time delayed Gaussian filter in the time domain.

17. A method of claim 16 wherein the Gaussian filter comprises a plurality of cascaded stages each stage having a decaying exponential system function between stages.

18. A method of claim 17 wherein the Gaussian filter is modulated in the time domain to produce a frequency shift of the sampling and modulation in the frequency domain.

19. The method of claim 16 wherein the filter is characterized in time by:

$$\frac{\alpha}{\sqrt{2\pi}} e^{-\frac{\left(t-\frac{\sqrt{N}}{\alpha}\right)^2}{\frac{2}{\alpha^2}}}$$

wherein $\sqrt{\frac{N}{\alpha}}$ is a delay parameter, α is a half-width parameter, and t is the time parameter.

20. The method of claim 19 wherein the filter, in frequency space, is characterized by:

$$e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

wherein $\sqrt{\frac{N}{\alpha}}$ and α are a corresponding delay parameter and a half-width parameter in time, respectively, and f is the frequency parameter.

21. The method of claim 1 wherein the probability expectation value is based upon Poissonian probability.

22. The method of claim 21 wherein the probability expectation value is characterized by

$$\prod_s \left[p_{\uparrow_s} + \left(P - p_{\uparrow_s}\right)\exp\left[-\beta_s^{-2}\left(\frac{1-\cos 2\phi_s}{2}\right)\right]\cos(\delta_s + 2\sin\phi_s)\right]$$

wherein P is the maximum probability of at least one other Fourier series being associated with a first Fourier series, $p_{\uparrow_s}$ is a probability of at least one other Fourier series being associated with a first Fourier series in the absence of coupling of the first Fourier series with the at least one other Fourier series, β_s^2 is a number that represents the amplitude of spectral similarity between at least two filtered or unfiltered Fourier series, ϕ_s represents the frequency difference angle between at least two filtered or unfiltered Fourier series, and δ_s, is a phase factor.

23. The method of claim 22 wherein β_s^2 is characterized by

$$\beta_s^2 = (8\pi)^2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}} \sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s} \exp - \left\{ \frac{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} - \frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}}\right)^2}{2} \right\}$$

$\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters selected from one of:

i.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the physical characteristic.

24. The method of claim 22 wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1} \frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} - \sum_{m_s=1}^{M_s} \frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}}\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1} \frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}}}$$

$\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters selected from one of:

i.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the physical characteristic.

25. The method of claim 22 wherein β_s^2 is characterized by

$$\beta_s^2 = (8\pi)^2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\alpha_1^2 \alpha_s^2}{\alpha_1^2 + \alpha_s^2}} \sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s}$$

$$\exp - \left\{ \frac{\frac{\alpha_1^2 \alpha_s^2}{\alpha_1^2 + \alpha_s^2} \left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}} \right) - \left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}} \right) \right)^2}{2} \right\}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$, $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters selected from one of:

i.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the physical characteristic.

26. The method of claim 22 wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \sum_{m_s=1}^{M_s}\left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1, and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation

velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters selected from one of:

i.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the physical characteristic.

27. A method of linking at least two Fourier series stored in a memory comprising the steps of

a.) generating a probability expectation value that recalling any part of one of the Fourier series from the memory causes at least another Fourier series to be recalled from the memory;

b.) storing the probability expectation value to memory;

c.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value, and

d.) recalling the at least another Fourier series from the memory if the operand is one.

28. The method of claim 27 whereby the probability expectation value increases with a rate of recalling any part of any of the Fourier series.

29. A method for pattern recognition and processing information comprising the steps of:

representing the information as a plurality of Fourier series in Fourier space;

forming associations between at least two of the Fourier series by modulating and sampling the Fourier series with filters and by coupling the filtered Fourier series based on a probability distribution;

adding the associated Fourier series to form a string, and

ordering the string.

30. The method claim 29 wherein the filter is a time delayed Gaussian filter in the time domain.

31. The method claim 29 wherein the probability distribution is Poissonian.

32. The method of claim 1, wherein the string is selected from one of:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho 0}}N_{s,m_{z0}}\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

and

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}\frac{4}{\rho_{0_{s,m}}z_{0_{s,m}}}\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$, $N_{s,m_{z0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters selected from one of:

i.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the physical characteristic.

33. A method of ordering a string representing information using a high level memory comprising a set of initial ordered Fourier series, comprising the steps of:

a.) obtaining a string from a memory;

b.) selecting at least two filters from a selected set of filters;

c.) sampling the string with the filters such that each of the filters produces a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

h.) determining a probability expectation value based on the spectral similarity;

i.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value;

j.) repeating steps b-i until the probability operand has a value of one;

k.) storing the summed Fourier series to an intermediate memory;

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a value of one or all of the updated filters have been selected from the updated set of filters;

x.) if all of the updated filters have been selected before the probability operand has a value of one, then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a value of one, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps l-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

aa.) storing the Fourier series in the intermediate memory in the high level memory.

34. A method of claim 33 wherein the high level memory is initialized with standard inputs.

35. The method of claim 33 wherein the ordering is according to one of the list of: temporal order, cause and effect relationships, size order, intensity order, before-after order, top-bottom order, or left-right order.

36. The method of claim 33 wherein each filter of the set of filters is a time delayed Gaussian filter having a half-width parameter α which determines the amount of the string that is sampled.

37. The method of claim 33 wherein each filter of the set of filters is a time delayed Gaussian filter having a delay parameter $\sqrt{\frac{N}{\alpha}}$ which corresponds to a time point.

38. The method of claim 37, wherein each Fourier series of the string is multiplied by the Fourier transform of the delayed Gaussian filter represented by $e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\sqrt{\frac{N_{s\rho 0}}{\alpha_{s\rho 0}}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\sqrt{\frac{N_{sz0}}{\alpha_{sz0}}}(v_{sz0}k_z)}$ wherein the filter established the correct order to form the string, wherein the ordered string is represented by:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho 0}}N_{s,m_{z0}}e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\sqrt{\frac{N_{s\rho 0}}{\alpha_{s\rho 0}}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\sqrt{\frac{N_{sz0}}{\alpha_{sz0}}}(v_{sz0}k_z)}$$

$$e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{t_{s,m}}\right)}\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{v_{s,m}t_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho 0}$ and v_{sz0} are constants such as the signal propagation velocities in the ρ and z directions, respectively, $\sqrt{\frac{N_{s\rho 0}}{\alpha_{s\rho 0}}}$ and $\sqrt{\frac{N_{sz0}}{\alpha_{sz0}}}$ are delay parameters and $\alpha_{s\rho 0}$ and α_{sz0} are half-width parameters of a corresponding Gaussian filter in the ρ and z directions, respectively, $\rho_{t_{s,m}} = v_{t_{s,m}}t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}} = v_{fb_{s,m}}t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$, $N_{s,m_{z0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters selected from one of:

i.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters $N_{s,m_{\rho 0}}$ and $N_{s,m_{z0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{s,m}}$ and $z_{0_{s,m}}$ of each Fourier component is inversely proportional to the physical characteristic.

39. The method of claim 38, wherein $v_{s,m}t_{0_{s,m}} = \rho_{0_{s,m}}$ and $k_\rho = k_z$ such that the string in Fourier space is one dimensional in terms of k_ρ and is represented by

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty} a_{0_{s,m}} N_{s,m_{\rho 0}} e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\sqrt{\frac{N_{s\rho 0}}{\alpha_{s\rho 0}}}(v_{s\rho 0}k_\rho)} e^{-jk_\rho \rho_{fb_{s,m}}} \sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho 0}$ is a constant such as the signal propagation velocity in the ρ direction, $\sqrt{\frac{N_{s\rho 0}}{\alpha_{s\rho 0}}}$ is a delay parameter and $\alpha_{s\rho 0}$ is a half-width parameter of a corresponding Gaussian filter in the k_ρ-space, $\rho_{fb_{s,m}} = v_{fb_{s,m}} t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{fb_{s,m}}$ is a constant such as the signal propagation velocity, $a_{0_{s,m}}$ is a constant, k_ρ is the frequency variable, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$ and $\rho_{0_{s,m}}$ are data parameters selected from one of:

i.) the data parameter $N_{s,m_{\rho 0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic; and

the data parameter $\rho_{0_{s,m}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) the data parameter $N_{s,m_{\rho 0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic; and

the data parameter $\rho_{0_{s,m}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) the data parameter $N_{s,m_{\rho 0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer; and

the data parameter $\rho_{0_{s,m}}$ of each Fourier component is inversely proportional to the physical characteristic.

40. The method of claim 33 wherein the probability expectation value is based upon Poissonian probability.

41. The method of claim 40 wherein the probability expectation value is characterized by

$$\prod_s \left[p_{\uparrow_s} + \left(P - p_{\uparrow_s}\right) \exp\left[-\beta_s^{-2}\left(\frac{1-\cos 2\phi_s}{2}\right)\right] \cos(\delta_s + 2\sin\phi_s) \right]$$

wherein P is the maximum probability that at least one other Fourier series is active given that a first Fourier series is active, $p_{\uparrow_s}$ is a probability of a Fourier series becoming active in the absence of coupling from at least one other active Fourier series, β_s^2 is a number that represents the amplitude of spectral similarity between at least two filtered or unfiltered Fourier series, ϕ_s represents the frequency difference angle between at least two filtered or unfiltered Fourier series, and δ_s, is a phase factor.

42. The method of claim 41 wherein β_s^2 is characterized by

$$\beta_s^2 = (8\pi)^2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\alpha_1^2 \alpha_s^2}{\alpha_1^2 + \alpha_s^2}} \sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s}$$

$$\exp - \left\{ \frac{\frac{\alpha_1^2 \alpha_s^2}{\alpha_1^2 + \alpha_s^2} \left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \left(\frac{N_{m_1} \rho_{0_{m_1}}}{2 v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}} \right) - \left(\frac{N_{m_s} \rho_{0_{m_s}}}{2 v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}} \right) \right)^2}{2} \right\}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$, $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters selected from one of:

i.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the physical characteristic.

43. The method of claim 41 wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \sum_{m_s=1}^{M_s}\left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1, and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters selected from one of:

i.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the rate of change of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the amplitude of the physical characteristic; or

ii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the amplitude of the physical characteristic; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the rate of change of the physical characteristic; or

iii.) each of the data parameters N_{m_1} and N_{m_s} of the Fourier series component is proportional to the duration of the signal response of each transducer; and

each of the data parameters $\rho_{0_{m_1}}$ and $\rho_{0_{m_s}}$ of each Fourier component is inversely proportional to the physical characteristic.

44. A system for pattern recognition and processing comprising:

an input layer that receives data representative of physical characteristics or representations of physical characteristics within an input context of the physical characteristics and transforms the data into a Fourier series in Fourier space wherein the input context is encoded in time as delays corresponding to modulation of the Fourier series at corresponding frequencies;

a memory comprising a set of initial ordered Fourier series;

an association layer that receives a plurality of the Fourier series in Fourier space from the memory, forms a string comprising a sum of Fourier series, and stores the string in memory;

a string ordering layer that receives the string and at least one ordered Fourier series from the memory, orders the Fourier series contained in the string to form an ordered string, and stores the ordered string in memory; and

a predominant configuration layer that receives multiple ordered strings from the memory, forms complex ordered strings from the ordered strings, stores the complex ordered strings to the memory, and activates the components of any of the layers of the system.

45. A method for pattern recognition and processing of information comprising the steps of:

a.) generating an activation probability parameter based a prior activation probability parameter and a weighting based on an activation rate of the corresponding component;

b.) storing the activation probability parameter in memory;

c.) generating a probability operand having a value selected from a set of zero and one, based on the activation probability parameter;

d.) activating any component of one or more of the group consisting of an input layer, an association layer, a string ordering layer, and a predominant configuration layer, the activation being based on the activation probability parameter, and

e.) repeating steps a-d.

46. A computer-readable medium on which is stored a computer program for providing a method for pattern recognition and processing of

information, the information comprising data representative of physical characteristics or representations of physical characteristics within an input context of the characteristics, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) encoding the data as parameters of at least two Fourier components in Fourier space;

b.) adding the Fourier components to form at least two Fourier series in Fourier space, the Fourier series representing the information;

c.) sampling at least one of the Fourier series in Fourier space with a filter to form a sampled Fourier series;

d.) modulating the sampled Fourier series in Fourier space with the filter to form a modulated Fourier series;

e.) determining a spectral similarity between the modulated Fourier series and another Fourier series;

f.) determining a probability expectation value based on the spectral similarity;

g.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value;

h.) repeating steps a-g until the probability operand has a value of one;

i.) adding the modulated Fourier series and the another Fourier series to form a string of Fourier series in Fourier space, and

j.) recording the string of Fourier series to memory.

47. A computer-readable medium on which is stored a computer program for providing a method of ordering a string representing information using a high level memory, the high level memory maintaining a set of initial ordered Fourier series, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) obtaining a string from a memory;

b.) selecting at least two filters from a selected set of filters;

c.) sampling the string with the filters such that each of the filters produce a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

h.) determining a probability expectation value based on the spectral similarity;

i.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value;

j.) repeating steps b-i until the probability operand has a value of one;

k.) storing the summed Fourier series to an intermediate memory;

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a value of one or all of the updated filters have been selected from the updated set of filters;

x.) if all of the updated filters have been selected before the probability operand has a value of one then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a value of one, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps 1-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

aa.) storing the Fourier series in the intermediate memory in the high level memory.

48. A computer-readable medium on which is stored a computer program for providing a method for forming complex ordered strings, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) recording ordered strings to a high level memory;

b.) forming association between Fourier series of the ordered strings to form complex strings;

c.) ordering the Fourier series of the complex strings to form complex ordered strings, and

d.) storing the complex ordered strings to the high level memory.

49. A computer-readable medium on which is stored a computer program for providing a method for forming a predominant configuration, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) generating an activation probability parameter based a prior activation probability parameter and a weighting based on an activation rate of the corresponding component;

b.) storing the activation probability parameter in memory;

c.) generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value selected from a set of zero and one, based on the activation probability parameter;

d.) activating any component of one or more of the group consisting of an input layer, an association layer, a string ordering layer, and a predominant configuration layer, the activation being based on the activation probability parameter, and

e.) repeating steps a-d.

50. A computer program product for pattern recognition and processing of information for use in a general purpose computer including a central processing unit and a memory, the memory maintaining a set of initial ordered Fourier series, the computer program product comprising:

a computer readable medium;

program code means embodied in the computer readable medium, the program code means comprising:

means for receiving data representative of physical characteristics or representations of physical characteristics within an input context of the physical characteristics and transforming the data into a Fourier series in Fourier space wherein the input context is encoded in time as delays corresponding to modulation of the Fourier series at corresponding frequencies;

means for receiving a plurality of the Fourier series in Fourier space including at least one ordered Fourier series from the memory, forming a string comprising a sum of the Fourier series and storing the string in memory;

means for retrieving the string from memory, ordering the Fourier series contained in the string to form an ordered string and storing the ordered string in memory; and

means for retrieving multiple ordered strings from the memory, forming complex ordered strings from the ordered strings and storing the complex ordered strings to the memory.

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